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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
DOTE, JANIS L	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/679,480	SUZUKI ET AL.
	Examiner	Art Unit
	Janis L. Dote	1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,5-7,10,11,15-17,20,24-26,29,33-35 and 38-47* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5-7,10,11,15-17,20,24-26,29,33-35 and 38-47* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 October 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/12/04;5/3/04;* 5/27/04; 8/31/04
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. A request for continued examination under 37 CFR 1.114 was filed in this application after appeal to the Board of Patent Appeals and Interferences, but prior to a decision on the appeal. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicants' submission filed on May 27, 2004, has been entered.

2. The examiner acknowledges the amendments to claims 1, 10, 20, and 29, and the addition of claims 46 and 47 filed on Aug. 23, 2004. Claims 1, 5-7, 10, 11, 15-17, 20, 24-26, 29, 33-35, and 38-47 are pending.

3. The "Amendment to the claims" section filed on May 27, 2004, was held not in compliance with 37 C.F.R. 1.121 for the reasons discussed in the "Notice of non-compliant amendment" mailed on Jul. 27, 2004. Thus, the "Amendment to the claims" section filed on May 27, 2004, was not entered.

4. The examiner has only considered the copy of the originally filed claims, abstract, and figures, provided by

applicants, of the copending US application listed in the Information Disclosure Statement filed on May 3, 2004.

The examiner has only considered those portions of the copending US application listed in the Information Disclosure Statement (IDS) filed on Mar. 12, 2004, i.e., the originally filed claims and figures, which caused it to be listed. See page 1 of the IDS.

The examiner has considered the copending US application listed in the Information Disclosure Statement (IDS) filed on Aug. 31, 2004.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 46 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 46 is indefinite in the phrase "having a drum diameter of 30 mm" for lack of unambiguous antecedent basis in the claim 1. Claim 1 does not recite a drum, but merely recites an electroconductive substrate.

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 1, 5, 38, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent 8-029998 (JP'998) combined with Japanese Patent 07-295250 (JP'250). See the DERWENT machine-assisted translations of JP'998 and JP'250, and the Japanese Patent Office (JPO) machine-assisted translation of JP'998 for cites.

JP'998 discloses an electrophotographic photoreceptor comprising a conductive aluminum drum having a diameter of 80 mm, an intermediate layer, a charge generation layer, and a charge transport layer. The charge generation layer comprises 3 parts by weight of a τ-form metal-free phthalocyanine pigment and 3.5 parts by weight of the asymmetric bisazo pigment (I-24) that meets the limitations of formula (VII) recited in instant claim 38. DERWENT translation, Table 1B(6), compound (I)-24; paragraphs 0035 and 0042; and example 8 in paragraph 0047. The weight ratio of phthalocyanine pigment to bisazo pigment is 3:3.5, which is within the range of 1:5 to 5:1 recited in instant claim 1. The intermediate layer has a layer thickness of 0.1 μm. See

the JPO translation, paragraph 0035, lines 4-5. (Note that the DERWENT translation of paragraph 0035 is missing the text in lines 4-5 of the JPO translation.) JP'998 also discloses that the asymmetric bisazo pigment can equally be the asymmetric bisazo pigment (I-29), which meets the limitations of formula (VIII) recited in instant claim 39. See the DERWENT translation, Table 1-(7), compound (I)-29; paragraph 0043; and example 9, paragraph 0047. According to JP'998, its photoreceptor has high spectral sensitivity in the visible light to the near infrared region. DEWENT translation, paragraph 0004.

JP'998 does not exemplify a photoreceptor comprising an intermediate layer comprising titanium oxide as recited in the instant claims. However, JP'998 discloses that a fine-powder pigment of a metallic oxide, such as titanium oxide, may be added to the binder resin of its intermediate layer to prevent the occurrence of moire and to reduce the residual electric potential of the photoreceptor. DERWENT translation, paragraph 0030. These are the same benefits sought by applicants. See the instant specification, page 31, lines 9-11.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of JP'998, to add

the metal pigment titanium oxide to the intermediate layer in the photoreceptor disclosed by JP'998 because that person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor that prevents the occurrence of moire and exhibits a reduction in residual electric potential.

JP'998 also does not disclose that the charge transport layer comprises a sulfur-containing compound as recited in the instant claims. However, JP'998 discloses that the charge transport layer can comprise an antioxidant. DERWENT translation, paragraph 0027.

JP'250 discloses sulfur-containing compounds that meet the compositional limitations of formulas (III), (S-1), (S-2), and (S-3) recited in the instant claims. JP'250 discloses that said sulfur-containing compounds can be used as antioxidants in charge transport layers of photoreceptors. DERWENT translation, paragraph 0007, compounds (I-1) to (I-4) at paragraph 0026, compounds (II-1) to (II-3) at paragraph 0028. JP'250 discloses that said sulfur-containing compounds prevent the deterioration of the photoreceptor due to ozone in the ambient air or due to strong light irradiation. The photoreceptor is said to have improved potential stability over long periods of time. DERWENT

translation, paragraphs 0003, 0006,0007, and paragraph 0054, lines 1-4. JP'250 further teaches that its sulfur-containing antioxidants provide photoreceptors with improved stability of electrification and sensitivity over long periods of time compared to known hindered phenol antioxidants. DERWENT translation, Table 1, comparative examples 3 and 4, and paragraph 0054, lines 14-18.

It would have been obvious for a person having ordinary skill in the art to use JP'250's sulfur-containing compound that meets the compositional limitation of formulas (III), (S-1), (S-2), or (S-3) recited in the instant claims, as the antioxidant in the charge transport layer in the photoreceptor rendered obvious over the teachings of JP'998, because that person would have had a reasonable expectation of successfully obtaining a photoreceptor that has improved potential stability over long periods of time and provides stable toner images after many repeated copies.

9. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP'998 combined with JP'250 as applied to claim 1 above, further combined with additional teachings in JP'998. See the DERWENT translations of JP'998 and JP'250, and the JPO translation of JP'998 for cites.

JP'998 combined with JP'250 renders obvious an electrophotographic photoreceptor as described in paragraph 8 above, which is incorporated herein by reference.

JP'998 does not exemplify an intermediate layer having a layer thickness of 3 μm as recited in instant claim 47. However, as discussed in paragraph 8 above, JP'998 discloses that a fine-powder pigment of a metallic oxide, such as titanium oxide, may be added to the binder resin of its intermediate layer to prevent the occurrence of moire and to reduce the residual electric potential of the photoreceptor. DERWENT translation, paragraph 0030. These are the same benefits sought by applicants. See the instant specification, page 31, lines 9-11. JP'998 also teaches that intermediate layer may have a layer thickness of "0 to 10 μm." DERENT translation, paragraph 0031. The range of "0 to 10 μm" encompasses the thickness of 3 μm recited in instant claim 47.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of JP'998, to add the metal pigment titanium oxide to the intermediate layer and to adjust, through routine experimentation, the thickness of the intermediate layer, such that the thickness is 3 μm, as recited in instant claim 47, in the photoreceptor rendered obvious over the combined teachings of JP'998 and JP'250,

because that person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor that prevents the occurrence of moire and exhibits a reduction in residual electric potential, and the benefits disclosed by JP'250.

10. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP'998 combined with JP'250 as applied to claim 1 above, further combined with US 5,763,125 (Kawata). See the DERWENT translations of JP'998 and JP'250, and the JPO translation of JP'998 for cites.

JP'998 combined with JP'250 renders obvious an electrophotographic photoreceptor as described in paragraph 8 above, which is incorporated herein by reference.

JP'998 does not exemplify a photoreceptor comprising an electroconductive drum having a diameter of 30 mm as recited in instant claim 46. However, JP'998 does not limit the type of electroconductive substrate used. JP'998 discloses that the electroconductive substrate "shows an electroconductivity of volume resistivity 10^{10} (OMEGA)•cm or less." DERWENT translation, paragraph 0017. As discussed in paragraph 8 above, JP'998 exemplifies the use of an aluminum drum.

According to Kawata, electrophotographic photoreceptors have been generally prepared using cylinder-shaped based bodies made of aluminum alloy. Unfortunately, the aluminum body needs high-precision machining if it is to meet the requirements for dimensions and surface roughness. Moreover, the surface of the aluminum body tends to oxidize and deteriorate when subjected to water and oxygen in the atmosphere. The surface must be treated with anodized aluminum or with chemicals to prevent the change of its properties. Kawata, col. 1, lines 16-30. Kawata further discloses that "[I]n recent years . . . an electrophotographic photoreceptor with comparatively small diameter has been in great demand for miniaturizing the electrophotographic device, improving printing speed thereof . . . Thus a rotational speed of the photoreceptor must be increased to the level enough to perform a printing or a copy at the same speed as that of the conventional one and it results in a frequent use of the photoreceptor. The photoreceptor should be prepared so as to response to light at a high speed with an excellent durability enough to stand the frequent use." Col. 1, lines 36-46. Kawata teaches an electrically conductive cylindrical base for use in electrophotographic photoreceptors that show "excellent properties of lightness in weight, less surface deterioration

in atmospheric air, high mechanical strength, appropriate surface roughness, resistance to distortion at high temperature, resistance to organic solvent, and high conductivity . . . which are substantially stable in time." Col. 1, lines 61-66. Kawata further discloses that manufacturing its conductive cylindrical base is cost effective and easy compared to the manufacturing of conventional bases. Col. 1, lines 57-59. The cylindrical substrate comprises a base made of a fiber-reinforced plastic comprising glass fiber, an unsaturated polyester resin, carbon black as the conductive fine powder, and an inorganic filler, and a conductive resin layer comprising a thermosetting resin and a conductive fine powder. The cylindrical substance has a diameter of about 30 mm and the conductive surface layer has a thickness of 50 μm. Example 1 at col. 4, and Table 2, example 1. The electrical cylindrical base in example 1 of Kawata has a volume resistivity of 2×10^2 Ω•cm, which is within the teachings of JP'998. Kawata teaches that the cylindrical substance may have an external diameter of 20 to 100 mm, and the thickness of the conductive layer may range between 40 to 100 μm. Col. 2, lines 47-51.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Kawata, to use

an electrically conductive cylindrical base as taught by Kawata, and to adjust, through routine experimentation, the manufacturing conditions, such that the overall outer diameter of the base is 30 mm as recited in instant claim 46, and to use the resultant electrically conductive cylindrical base as the electroconductive substrate in the photoreceptor rendered obvious over the combined teachings of JP'998 and JP'250. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor that is easily manufactured, light in weight with dimensional stability, and small in size to be used in miniaturized space-saving electrophotographic devices.

11. Claims 10, 11, 15, 20, 24, 29, 33, and 40-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'998 combined with JP'250, as applied to claims 1, 5, 38, and 39 above, further combined with US 5,047,803 (Kanoto). See the DERWENT translations of JP'998 and JP'250, and the JPO translation of JP'998 for cites.

JP'998 combined with JP'250 renders obvious an electrophotographic photoreceptor as described in paragraph 8 above, which is incorporated herein by reference.

JP'998 does not disclose that the electrophotographic photoreceptor can be used in a process cartridge or an apparatus as recited in the instant claims. Nor does JP'998 disclose that its photoreceptor can be used in the imaging forming method recited in the instant claims.

However, the use of process cartridges in electrophotographic apparatuses are well-known in the art.

Kanoto discloses that process cartridges in electrophotographic apparatuses are well-known in the art. Kanoto discloses that process cartridges comprising an electrophotographic photoreceptor and at least one processing means, such as a contact roller charger or corona charger, a developing device, a cleaner, and other elements are widely used in the field of image forming apparatuses that are small and that do not require maintenance. Col. 1, lines 18-28, and col. 3, lines 36-38. Kanoto discloses an imaging forming apparatus comprising a process cartridge that is easily dismounted from the main assembly of the image forming apparatus. Col. 1, lines 60-63. Kanoto shows an example of such an apparatus in Fig. 1. The apparatus comprises a process cartridge **100**, a laser beam scanner **7** as the image-wise exposure source, an image transfer roller **8** to transfer the toned image from the photoreceptor to a receiving member,

and a pair of fixing rollers **15a** and **15b** to fix the toned image on the receiving member. The process cartridge **100** comprises a photosensitive drum **1** (i.e., photoreceptor), a charging roller **2**, a developing device **3**, and a cleaning device **4** to remove residual toner or other contaminants from the photoreceptor after development. See Fig. 1, and col. 2, line 37, to col. 4, line 38. Kanoto discloses that the charging roller **2**, the developing device **3**, or the cleaning device **4** need not be contained in the process cartridge **100**, but can be part of the image forming apparatus. Col. 2, lines 57-60. Kanoto further discloses that the developing device **3** in the process cartridge or image forming apparatus can reverse develop the electrostatic latent image formed on the photoreceptor with a developer having the same polarity as the charge remaining on the photoreceptor. Col. 3, lines 57-61. Kanoto further discloses that its imaging apparatus performs an image forming process that meets the process steps recited in instant claim 29, but for the step of the providing the particular photoreceptor. Kanoto, col. 3, line 49, to col. 4, line 38.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Kanoto, to incorporate the electrophotographic photoreceptor rendered

obvious over the combined teachings of JP'998 and JP'250 in Kanoto's detachable process cartridge in its image forming apparatus, because that person would have had reasonable expectation of successfully obtaining a reversal development imaging method and an image forming apparatus comprising an easily detachable process cartridge having the benefits of being small and free from maintenance that provide stable toner images after many repeated runs as disclosed by JP'250.

12. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP'998 combined with JP'250, as applied to claim 5 above, further combined with US 4,507,374 (Kakuta) and DERWENT abstract Acc. No. 1983-816039. See the DERWENT translations of JP'998 and JP'250, and the JPO translation of JP'998 for cites.

JP'998 combined with JP'250 renders obvious a photoreceptor as described in paragraph 8 above, which is incorporated herein by reference.

As set forth in paragraph 8, supra, JP'998 discloses that the phthalocyanine pigment is a τ-form metal-free phthalocyanine. However, JP'998 does not disclose that the τ-form metal-free phthalocyanine pigment has the X-ray diffraction pattern recited in the instant claims.

Kakuta discloses a τ-form metal-free phthalocyanine pigment having a X-ray diffraction pattern with characteristic Bragg angles (2θ ± 0.2°) of 7.6°, 9.2°, 16.8°, 17.4°, 20.4°, and 20.9°. Col. 2, lines 16-19, col. 4, lines 38-42, 53-55, and Fig. 4. Kakuta discloses that photoreceptors comprising said phthalocyanine exhibits high sensitivities to longer wavelength light. Col. 1, lines 58-63. Kakuta discloses that said phthalocyanine exhibits a maximum sensitivity at 790-810 nm, and is most useful in photoconductors image-wise exposed to a semiconductor laser. Col. 9, lines 38-41.

Kakuta does not disclose that the X-ray diffraction pattern of its τ-form metal-free phthalocyanine exhibits Bragg angles of 21.7° and 27.6° as recited in the instant claims. However, the instant specification discloses that the τ-form metal-free phthalocyanine having the X-ray diffraction pattern recited in the instant claims can be prepared by a method described in Japanese Patent 58-182639 (JP'639). Specification, page 21, lines 11-19. Kakuta is the US equivalent of JP'639. See the DERWENT abstract Acc. No. 1983-816039. Because all six Bragg angles disclosed by Kakuta correspond to Bragg angles recited in the instant claims, and because Kakuta's τ-form metal-free phthalocyanine is obtained by a method that makes a τ-form metal-free

phthalocyanine having the X-ray diffraction pattern recited in the instant claims, it is reasonable to presume that Kakuta's τ-form metal-free phthalocyanine has a X-ray diffraction pattern that meets the limitation recited in the instant claims. The burden is on applicants to prove otherwise. In re Fitzgerald, 205 USPQ 594 (CCPA 1980).

It would have been obvious for a person having ordinary skill in the art to use Kakuta's τ-form metal-free phthalocyanine pigment as the τ-form metal-free phthalocyanine in the photoreceptor rendered obvious over the combined teachings of JP'998 and JP'250, because that person would have had a reasonable expectation of successfully obtaining a photoreceptor having improved sensitivity to the longer wavelength region, and having the benefits disclosed by JP'998 and JP'250.

13. Claims 16, 25, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'998 combined with JP'250 and Kanoto, as applied to claim 15, 24, and 33 above, further combined with Kakuta and DERWENT abstract Acc. No. 1983-816039. See the DERWENT translations of JP'998 and JP'250, and the JPO translation of JP'998 for cites.

JP'998 combined with JP'250 and Kanoto renders obvious an imaging apparatus comprising a process cartridge and an image forming method as described in paragraph 11 above, which is incorporated herein by reference.

JP'998 discloses that the phthalocyanine pigment is a τ-form metal-free phthalocyanine. JP'998 does not disclose that the τ-form metal-free phthalocyanine pigment has the X-ray diffraction pattern recited in the instant claims. However, Kakuta discloses a τ-form metal-free phthalocyanine pigment that appears to have a X-ray diffraction pattern that meets the limitations recited in the instant claims. The discussion of Kakuta in paragraph 12, supra, is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art to use Kakuta's τ-form metal-free phthalocyanine pigment as the τ-form metal-free phthalocyanine in the photoreceptor rendered obvious over the combined teachings of JP'998 and JP'250, and to use the resultant photoreceptor in the apparatus disclosed by Kanoto, because that person would have had a reasonable expectation of successfully obtaining a photoreceptor having improved sensitivity to the longer wavelength region, thereby providing an electrophotographic image forming apparatus comprising an

easily detachable process cartridge and a reversal development imaging method that provide good toner images as taught by JP'250.

14. Applicants' arguments filed on May 27, 2004, with respect to the rejections over JP'998 combined with JP'250, set forth in paragraphs 8-13 above, have been fully considered but they are not persuasive.

Applicants assert that the Rule 132 declaration, executed by Yasuo Suzuki on May 21, 2004, filed on May 27, 2004, shows that the instantly claimed invention yields unexpected superior results over the prior art. Applicants further assert that the results are independent of the drum diameter or the intermediate layer thickness.

However, the showings in the declaration are insufficient to overcome the rejections because they do not to show that the instantly claimed invention yields unexpected results over the prior art of JP'998 for the following reasons:

(1) The showing in the declaration is not commensurate in scope with the instant claims. The evidence in the declaration is insufficient to show that the full scope of the instant claims yields unexpected results over the prior art.

The declaration exemplifies photoreceptors comprising aluminum drums having a diameter of 80 mm, an intermediate layer having a thickness of 4.5 μm, and a charge transfer layer comprising 0.9 parts by weight of the particular organic sulfur-containing antioxidant S-1, III-3, or III-6 based on 100 parts by weight the of the charge transfer material. See examples A through C.

(a) The instant claims do not limit the amount of the organic sulfur-containing antioxidant in the charge transfer layer. Nor do the instant claims limit the amount to be 0.9 parts by weight based on 100 parts by weight of the charge transfer material. However, the instant specification discloses at page 30, lines 11-15, that the "concentration of the antioxidant [the organic sulfur-containing antioxidant] in the charge transfer layer . . . is from 0.1 to 5 parts by weight when the total weight of the charge transfer material included therein I is 100 parts." The instant specification at page 30, lines 16-21, appears to disclose that such a range is required to obtain the desired effects sought by applicants, e.g., good charge stability and good images without undesired background fouling and black dots. Applicants have not shown that any of the argued unexpected results are obtainable from amounts outside the disclosed

amount range of 0.1 to 5 parts by weight per 100 parts of the charge transfer material.

(b) Furthermore, the photoreceptors only show the use of organic sulfur-containing antioxidant S-1 and those representative of formula III recited in the instant claims. The declaration shows that photoreceptors comprising organic sulfur-containing antioxidants of formula III provide 200,000 images with no black spots, while black spots were observed after 173,000 copies using a photoconductor comprising organic sulfur-containing antioxidant S-1. When no organic sulfur-containing antioxidant is used, black spots were observed after 105,000 copies. See declaration, Table A, examples A-C, and comparative example A. The difference between 173,000 and 105,000 is about 39%. The declaration does not exemplify photoreceptors comprising organic sulfur-containing antioxidants S-2 and S-3 recited in the instant claims. Antioxidants S-2 and S-3 are not similar to those of formula III. Although antioxidants S-2 and S-3 appear to be related the antioxidant S-1, there is no evidence on the present record showing that photoreceptors comprising antioxidants S-2 and S-3 provide the same results as shown in the declaration from photoreceptors comprising antioxidants S-1 and those representative of formula III.

(c) Moreover, the declaration does not show that the results are independent of the intermediate layer thickness as alleged by applicants. The declaration only exemplifies photoreceptors that comprise an aluminum drum having a diameter of 80 mm comprising only one intermediate layer having a thickness of 4.5 μm. A showing of only one layer thickness is insufficient to show that the alleged unexpected results in black spot formation are independent of the thickness of the intermediate layer. As discussed in the previous office action mailed on Aug. 27, 2003, paragraph 9, the Rule 132 declaration executed by Yasuo Suzuki on Jul. 4, 2002, filed on Jul. 8, 2002, attributes the differences in black spot formation between comparative examples 5 and 13 of the instant specification and examples 8 and 15 of US 6,136,483 (Suzuki'483) to the differences in the thickness in the undercoat layer. The declarant states that "the underlayer layer, which is thicker in the Suzuki Examples (4.5 μm) than in the present Comparative Examples (3.0 μm), has a charge blocking property." The declarant further states that "the thicker the underlayer, the better the black spot formation." Thus, the thickness of the intermediate layer appears to be a critical element to the reduction of formation of black spots. Independent claims 1, 10, 20,

and 29 do not limit the layer thickness of the intermediate layer. The instant specification at page 31, lines 24-25, discloses that the intermediate layer may have a thickness of "0 to 10 μm." There is no evidence on the present record showing that photoreceptors that comprise a conductive drum having a diameter of 80 mm comprising an intermediate layer having a thickness other than 4.5 μm, such as 0.1 μm as exemplified in the prior art, provides unexpected results in reduced formation of black spots.

(2) The Rule 132 declaration does not compare adequately to JP'998. Comparative example A comprises a drum having a diameter of 80 mm and an intermediate layer having a thickness of 4.5 μm. As discussed, supra, the intermediate layer thickness appears to be a critical element in the formation of images free from black spots. Instant independent claims 1, 10, 20, and 29 do not limit the thickness of the intermediate layer. The exemplification of an intermediate layer having a thickness of 4.5 μm is not commensurate in scope with the instant claims. As discussed in paragraph 8 above, JP'998 exemplifies photoreceptors comprising an aluminum cylinder having a diameter of 80 mm, and an intermediate layer having a thickness of 0.1 μm. See DERWENT translation and JPO translation, examples 8 and 9 in paragraph 0047. The instant

claims do not exclude the intermediate layer of 0.1 μm. In fact, the instant specification at page 31, lines 24-35, discloses that the intermediate layer may have a thickness ranging from 0 to 10 μm. The comparative examples do not exemplify such photoreceptors comprising drums having a diameter of 80 mm and an intermediate layer having a thickness of 0.1 μm. Accordingly, comparative example A of the declaration is not a probative comparison to JP'998.

Thus, given the welter of unconstrained variables and applicants' limited showings, applicants have not satisfied their burden to show that the full scope of the instantly claimed invention provides unexpected results over the prior art. Accordingly, the rejections over the combined teachings of JP'998 and JP'250 stand.

15. Claims 1, 5, 38, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent 7-128890 (JP'890) combined with JP'250. See the DERWENT machine-assisted translations of JP'890 and JP'250 for cites.

JP'890 discloses an electrophotographic photoreceptor comprising a conductive aluminum drum having a diameter of 80 mm, an intermediate layer, a charge generation layer, and a charge transport layer. The intermediate layer has a

thickness of 0.1 μm. The charge generation layer comprises 2.5 parts by weight of a X-form metal-free phthalocyanine pigment and 3 parts by weight of the asymmetric bisazo pigment (I-24) that meets the limitations of formula (VII) recited in instant claim 38. Translation, Table 1B(6), compound (I)-24; paragraphs 0035 and 0042; and example 8 in paragraph 0047. (Note that the DERWENT translation paragraph 0042 incorrectly states that "3.0 weight parts and 2.5 weight-parts of X type metal-less phthalocyanines were added for the illustration compound (1)-24 disazo pigment." Paragraph 0042 in JP'890 states 3.0 weight parts of the compound (1)-24 and 2.5 weight parts of X type metal-less phthalocyanine are used to form the charge generation layer.) The weight ratio of phthalocyanine pigment to bisazo pigment is 2.5:3, which is within the range of 1:5 to 5:1 recited in instant claim 1. JP'890 also discloses that the asymmetric bisazo pigment can equally be the asymmetric bisazo pigment (I-29), which meets the limitations of formula (VIII) recited in instant claim 39. See the translation, Table 1-(7), compound (I)-29; paragraph 0043; and example 9, paragraph 0047. According to JP'890, its photoreceptor has high spectral sensitivity in the visible light to the near infrared region. Translation, paragraph 0004.

JP'890 does not exemplify a photoreceptor comprising an intermediate layer comprising titanium oxide as recited in the instant claims. However, JP'890 discloses that a fine-powder pigment of a metallic oxide, such as titanium oxide, may be added to the binder resin of its intermediate layer to prevent the occurrence of moire and to reduce the residual electric potential of the photoreceptor. Translation, paragraph 0030. These are the same benefits sought by applicants. See the instant specification, page 31, lines 9-11.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of JP'890, to add the metal pigment titanium oxide to the intermediate layer in the photoreceptor disclosed by JP'890, because that person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor that prevents the occurrence of moire and exhibits a reduction in residual electric potential.

JP'890 does not disclose that the charge transport layer comprises a sulfur-containing compound as recited in the instant claims.

JP'250 discloses sulfur-containing compounds that meet the compositional limitations of formulas (III), (S-1), (S-2), and (S-3) recited in the instant claims. JP'250 discloses

that said sulfur-containing compounds can be used as antioxidants in charge transport layers of photoreceptors. The discussion of JP'250 in paragraph 8, supra, is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art to use JP'250's sulfur-containing compound that meets the compositional limitation of formulas (III), (S-1), (S-2), or (S-3) recited in the instant claims, as an antioxidant in the charge transport layer in the photoreceptor rendered obvious over the teachings of JP'890, because that person would have had a reasonable expectation of successfully obtaining a photoreceptor that has improved potential stability over long periods of time and provides stable toner images after many repeated copies.

16. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP'890 combined with JP'250 as applied to claim 1 above, further combined with additional teachings in JP'890. See the DERWENT translations of JP'890 and JP'250 for cites.

JP'890 combined with JP'250 renders obvious an electrophotographic photoreceptor as described in paragraph 15 above, which is incorporated herein by reference.

JP'890 does not exemplify an intermediate layer having a layer thickness of 3 μm as recited in instant claim 47. However, as discussed in paragraph 15 above, JP'890 discloses that a fine-powder pigment of a metallic oxide, such as titanium oxide, may be added to the binder resin of its intermediate layer to prevent the occurrence of moire and to reduce the residual electric potential of the photoreceptor. Translation, paragraph 0030. These are the same benefits sought by applicants. See the instant specification, page 31, lines 9-11. JP'890 also teaches that intermediate layer may have a layer thickness of "0 to 5 μm." Translation, paragraph 0031. The range of "0 to 5 μm" encompasses the thickness of 3 μm recited in instant claim 47.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of JP'890, to add the metal pigment titanium oxide to the intermediate layer and to adjust, through routine experimentation, the thickness of the intermediate layer, such that the thickness is 3 μm, as recited in instant claim 47, in the photoreceptor rendered obvious over the combined teachings of JP'890 and JP'250, because that person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor that prevents the occurrence of moire and exhibits a reduction

in residual electric potential, and the benefits disclosed by JP'250.

17. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP'890 combined with JP'250 as applied to claim 1 above, further combined with Kawata. See the DERWENT translations of JP'890 and JP'250 for cites.

JP'890 combined with JP'250 renders obvious an electrophotographic photoreceptor as described in paragraph 15 above, which is incorporated herein by reference.

JP'890 does not exemplify a photoreceptor comprising an electroconductive drum having a diameter of 30 mm as recited in instant claim 46. However, JP'890 does not limit the type of electroconductive substrate used. JP'890 discloses that the electroconductive substrate "shows an electroconductivity of volume resistivity 10^{10} (OMEGA)•cm or less." DERWENT translation, paragraphs 0017-0018. As discussed in paragraph 15 above, JP'890 exemplifies the use of an aluminum drum.

Kawata teaches an electrically conductive cylindrical base for electrophotographic photoreceptors. The discussion of Kawata in paragraph 10 above is incorporated herein by reference. Furthermore, the electrical cylindrical base in

example 1 of Kawata has a volume resistivity of 2×10^2 Ω•cm, which is within the teachings of JP'890.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Kawata, to use an electrically conductive cylindrical base as taught by Kawata, and to adjust, through routine experimentation, the manufacturing conditions of the base, such that the overall outer diameter of the base is 30 mm as recited in instant claim 46, and to use the resultant electrically conductive cylindrical base as the electroconductive substrate in the photoreceptor rendered obvious over the combined teachings of JP'890 and JP'250. That person would have had a reasonable expectation of successfully obtaining an electrophotographic photoreceptor that is easily manufactured, light in weight with dimensional stability, and small in size to be used in miniaturized space-saving electrophotographic devices.

18. Claims 10, 11, 15, 20, 24, 29, 33, and 40-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'890 combined with JP'250, as applied to claims 1, 5, 38, and 39 above, further combined with Kanoto. See the DERWENT translations of JP'890 and JP'250 for cites.

JP'890 combined with JP'250 renders obvious an electrophotographic photoreceptor as described in paragraph 15 above, which is incorporated herein by reference.

JP'890 does not disclose that the electrophotographic photoreceptor can be used in a process cartridge or an apparatus as recited in the instant claims. Nor does JP'890 disclose that its photoreceptor can be used in the imaging forming method recited in the instant claims.

However, the use of process cartridges in electrophotographic apparatuses are well-known in the art. Kanoto discloses an imaging forming apparatus comprising a readily detachable process cartridge. The apparatus and process cartridge meet the structural limitations recited in instant claims 10, 11, and 20, but for the particular photoreceptor. Kanoto further discloses that its imaging apparatus performs an image forming process that meets the process steps recited in instant claim 29, but for the step of the providing the particular photoreceptor. The discussion of Kanoto in paragraph 11, supra, is incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art, in view of the teachings of Kanoto, to incorporate the electrophotographic photoreceptor rendered

obvious over the combined teachings of JP'890 and JP'250 in Kanoto's detachable process cartridge in its image forming apparatus, because that person would have had reasonable expectation of successfully obtaining a reversal development imaging method and an image forming apparatus comprising an easily detachable process cartridge having the benefits of being small and free from maintenance that provide stable toner images after many repeated runs as disclosed by JP'250.

19. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP'890 combined with JP'250, as applied to claim 5 above, further combined with US 3,357,989 (Byrne). See the DERWENT translations of JP'890 and JP'250 for cites.

JP'890 combined with JP'250 renders obvious an electrophotographic photoreceptor as described in paragraph 15 above, which is incorporated herein by reference.

As set forth in paragraph 15, supra, JP'890 discloses that the phthalocyanine pigment is a X-form metal-free phthalocyanine. Translation of JP'890, examples 8 and 9. JP'890 does not disclose that the X-form metal-free phthalocyanine pigment has the X-ray diffraction pattern recited in the instant claim.

However, a X-form metal-free phthalocyanine pigment having a X-ray diffraction pattern recited in the instant claims is well-known in the art, as shown by Byrne. Byrne discloses a X-form metal-free phthalocyanine pigment having a X-ray diffraction pattern that meets the limitations recited in the instant claim. See Fig. 1, and col. 2, lines 50-54, col. 5, lines 14-22, and reference claim 1. Byrne's phthalocyanine has photosensitivity to the wavelength region of greater than 700 nm. See Fig. 2. Byrne discloses that his phthalocyanine is especially useful as a photoconductive material in electrophotography, and that it provides "surprisingly high photosensitivity." Col. 2, lines 3-9.

It would have been obvious for a person having ordinary skill in the art to use Byrne's X-form metal-free phthalocyanine pigment having a X-ray diffraction pattern that meets the limitation of the instant claim as the X-form metal-free phthalocyanine in the photoreceptor rendered obvious over the combined disclosures JP'890 and JP'250, because that person would have had a reasonable expectation of successfully obtaining a photoreceptor having improved sensitivity to the longer wavelength region and having the benefits disclosed by JP'890 and JP'250.

20. Claim 17, 26, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP'890 combined with JP'250 and Kanoto, as applied to claim 15, 24, and 33 above, further combined with Byrne. See the DERWENT machine-assisted translations of JP'890 and JP'250 for cites.

JP'890 combined with JP'250 and Kanoto renders obvious an imaging apparatus comprising a process cartridge and an image forming method as described in paragraph 18 above, which is incorporated herein by reference.

As discussed in paragraph 18 above, JP'890 discloses that the phthalocyanine pigment is a X-form metal-free phthalocyanine. JP'890 does not disclose that the X-form metal-free phthalocyanine pigment has the X-ray diffraction pattern recited in the instant claims. However, a X-form metal-free phthalocyanine pigment having a X-ray diffraction pattern recited in the instant claims is well-known in the art, as shown by Byrne. The discussion of Byrne in paragraph 19, supra, are incorporated herein by reference.

It would have been obvious for a person having ordinary skill in the art to use Byrne's X-form metal-free phthalocyanine pigment as the X-form metal-free phthalocyanine in the photoreceptor rendered obvious over the combined teachings of JP'890 and JP'250, and to use said photoreceptor

in the apparatus disclosed by Kanoto, because that person would have had a reasonable expectation of successfully obtaining a photoreceptor having improved sensitivity to the longer wavelength region, thereby providing an electrophotographic image forming apparatus comprising an easily detachable process cartridge and a reversal development imaging method that provide good toner images as taught by JP'250.

21. Applicants' arguments filed on May 27, 2004, with respect to the rejections over JP'890 combined with JP'250 set forth in paragraphs 15-20 above have been fully considered but they are not persuasive.

Applicants assert that the Rule 132 declaration, executed by Yasuo Suzuki on May 21, 2004, filed on May 27, 2004, shows that the instantly claimed invention yields unexpected superior results over the prior art.

However, the showings in the instant specification and in the declaration are insufficient to overcome the rejections because they do not to show that the instantly claimed invention yields unexpected results over the prior art of JP'890 for the following reasons:

(1) The showings in the specification and declaration are not commensurate in scope with the instant claims. The evidence in the specification and declaration is insufficient to show that the full scope of the instant claims yields unexpected results over the prior art.

The declaration and the instant specification exemplify preferred photoreceptors comprising aluminum drums having a preferred diameter of 30 mm, an intermediate layer having a preferred thickness of 3.0 μm, a charge generation layer comprising X-form metal-free phthalocyanine, and a charge transfer layer comprising 0.9 parts by weight of the particular organic sulfur-containing antioxidant based on 100 parts by weight the of the charge transfer material. See claims 46 and 47; the declaration, examples D-J; and the instant specification, examples 9-12.

As discussed in the previous office action mailed on Aug. 27, 2003, paragraph 9, which is incorporated herein by reference, the Rule 132 declaration executed by Yasuo Suzuki on Jul. 4, 2002, filed on Jul. 8, 2002, attributes the differences in black spot formation between examples comprising a drum having a diameter of 30 mm and an intermediate layer having a thickness of 3 μm and examples

comprising a drum having a diameter of 80 mm and an intermediate layer having a thickness of 4.5 μm to:

(a) The difference in the layer thickness of the intermediate layer. As discussed in paragraph 14, item 1(c) above, the declaration states that the thicker layer has a charge blocking property, and that the "thicker the undercoat layer, the better the black spot formation."

(b) The differences in the photoreceptor drum diameter. Thus, both the diameter of the photoreceptor drum and the thickness of the intermediate layer appear to be critical elements in the prevention of formation of black spots. Independent claims 1, 10, 20, and 29 do not recite these critical and preferred elements.

Moreover, for the reasons discussed in paragraph 14, item 1(a) with respect to the amount of organic sulfur-containing antioxidant, the showings in the declaration and the instant specification are not commensurate in scope with the instant claims of the specification.

(2) The Rule 132 declaration do not compare adequately to JP'890. Comparative examples B and F in the declaration comprise a drum having a diameter of 30 mm and an intermediate layer having a thickness of 3.0 μm. As discussed, supra, the intermediate layer thickness of 3 μm and the drum diameter of

30 mm are preferred elements and also appear to be a critical elements in the formation of images free from black spots. Instant independent claims 1, 10, 20, and 29 do not limit the thickness of the intermediate layer, or the diameter of the electroconductive drum. Claims 1, 10, 20, and 29 merely recite the presence of "an electroconductive substrate." The exemplification of a drum having a diameter of 30 mm and an intermediate layer having a thickness of 3 μm is not commensurate in scope with the instant claims. As discussed in paragraph 15 above, JP'890 exemplifies photoreceptors comprising an aluminum cylinder having a diameter of 80 mm, and an intermediate layer having a thickness of 0.1 μm. See DERWENT translation, examples 8 and 9 in paragraph 0047. The instant independent claims do not exclude JP'890's drum having a diameter of 80 mm or an intermediate layer of 0.1 μm. In fact, the instant specification at page 31, lines 24-35, discloses that the intermediate layer may have a thickness ranging from 0 to 10 μm. The comparative examples do not exemplify such photoreceptors comprising drums having a diameter of 80 mm and an intermediate layer having a thickness of 0.1 μm. Accordingly, comparative examples B and F of the declaration are not probative comparisons to JP'890.

Thus, given the welter of unconstrained variables and applicants' limited showings, applicants have not satisfied their burden to show that the full scope of the instantly claimed invention provides unexpected results over the prior art. Accordingly, the rejections over the combined teachings of JP'890 and JP'250 stand.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Janis L. Dote whose telephone number is (571) 272-1382. The examiner can normally be reached Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Mark Huff, can be reached on (571) 272-1385. The central fax phone number is (703) 872-9306.

Any inquiry of papers not received regarding this communication or earlier communications should be directed to Supervisory Application Examiner Ms. Claudia Sullivan, whose telephone number is (571) 272-1052.

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Janis L. Dote

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JLD
Sep. 28, 2004